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Date _____

Honors Algebra 2 Final Exam Review

The following is a review of chapters 6, 7, 8, 10, and 11. Do all problems on a separate sheet of paper and show your work! For more problems visit the extra practice sections in the back of your textbook.

A. Chapter 6: Quadratic Functions and Inequalities

Solve each equation by factoring or the quadratic formula. Write your answer in simplest radical form (where applicable).

1. $x^2 - 3x - 28 = 0$

2. $3x^2 - 4x - 2 = 0$

3. $x^2 - 4x = -13$

4. $4x^2 + 7x - 2 = 0$

Use the discriminant $b^2 - 4ac$ to determine the nature of the roots.

5. $2x^2 - 4x + 3 = 0$

6. $b^2 - 7b + 5 = 0$

7. $5x^2 + 2x = 3$

8. Find k such that $x^2 - 5x + k = 0$ has two imaginary roots. ($b^2 - 4ac < 0$)

Write a quadratic equation having the given solution set. ($x^2 - (r_1 + r_2)x + r_1 \cdot r_2 = 0$)

9. $\{3 + i, 3 - i\}$

10. $\{-4, 3\}$

Write a polynomial of smallest degree with integral coefficients having the given roots.

11. $2i, -3$ (remember if $2i$ is a root, what must also be a root?)

12. Solve by factoring and graph on a number line: $x^2 + 3x - 10 < 0$

B. Chapter 7: Polynomial Functions

1. Given $P(x) = x^4 - x^3 + x - 1$, find $P(3)$.

2. Use synthetic division. $(x^5 + 8x^3 + 2) \div (x - 2)$. Remember to put zeros in for missing terms.

Solve each equation.

3. $x^3 - 8 = 0$ (factor first, then use the Quadratic Formula. Remember, you should have 3 answers)

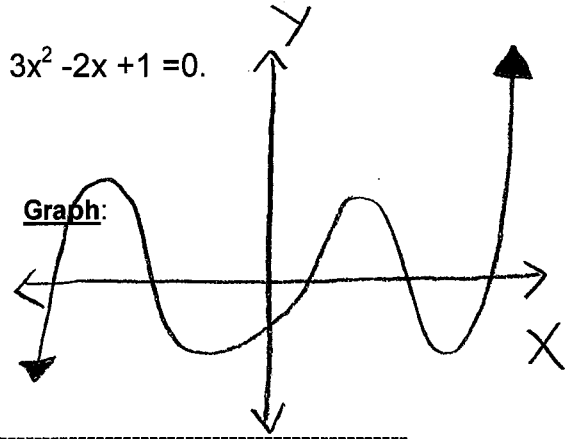
4. $x^4 + 2x^2 - 24 = 0$ (solve by factoring!)

5. Find all zeroes given $f(x) = x^3 - 3x^2 - 53x - 9$

6. Find all real roots using the graphing calculator: $x^3 + 3x^2 - 2x + 1 = 0$.

7. Find the inverse of $f(x) = 3x - 4$.

8. For the given graph of $f(x)$,
- describe the end behavior
 - determine whether it is an odd-degree or an even-degree polynomial function
 - state the number of real zeros
 - Is it a positive or negative leading coefficient?



C. Chapter 8: Conic Sections

Write the equation of the circle with the given the information.

1. $r = 5$; $C(-3, 4)$

2. $r = \frac{2}{3}$; $C(3, 2)$

3. Diameter endpoints: $(5, 2)$ $(-3, -2)$

For each ellipse, determine whether the major axis is horizontal or vertical.

4. $\frac{x^2}{16} + \frac{y^2}{49} = 1$

5. $x^2 + 9y^2 = 36$

6. $25x^2 + 16y^2 = 1600$

For each parabola, determine the vertex, focus, axis of symmetry, and directrix.

7. $y = (x+2)^2 - 7$

8. $y = x^2 - 3x + 5$

9. $x = y^2 - 3$

For each hyperbola, find the coordinates of the center, vertices, and foci.

10. $\frac{y^2}{49} - \frac{x^2}{4} = 1$

11. $\frac{x^2}{16} - \frac{y^2}{16} = 1$

12. $\frac{x^2}{1} - \frac{y^2}{4} = 1$

13. Solve the following system: $x^2 + y^2 = 100$; $y = 2 - x$

Write the equation in standard form for the given conic section with the given information.

14. Parabola; $V(2, -3)$ and $F(0, -3)$

15. Ellipse; Endpoints of major axis $(-2, 7)$ & $(4, 7)$; Endpoints of minor axis $(1, 5)$ & $(1, 9)$

16. Hyperbola; Vertices $(-3, 0)$ & $(3, 0)$; conjugate axis of length 8 units

17. Write the equation in standard form by **completing the square**. State whether the graph is a parabola, circle, ellipse, or hyperbola.

$$x^2 + 4y^2 + 2x - 24y + 33 = 0$$

D. Chapter 10: Exponential and Logarithm Equations

Solve.

1. $4^x = 32$

2. $27^x = \frac{1}{3}$

3. $9^{(x-2)} = 81$

Evaluate each logarithm.

4. $\log_4 128 = x$

5. $\log_{\frac{1}{3}} 27 = x$

6. $\log_{11} \frac{1}{121} = x$

Solve.

7. $\log_3 t = 5$

8. $\log_x \frac{1}{16} = -4$

9. $\log_{1000} b = \frac{-1}{3}$

Express without using multiplication or division.

10. $\log \left(\frac{x^2}{3y} \right)$

11. Solve $\log_8 (x+6) + \log_8 (x-6) = 2$

12. Solve $5^x = 52$

Solve.

13. $\ln(2x) = 4$

14. $3e^{3x} + 8 = 26$

Solve each problem.

15. You deposit \$20,000 in an account that earns 6 % interest, compounded annually. How much money will you have in the account after 10 years?

16. How long will it take \$10,000, at 5% interest compounded annually, to double in value?

17. A company bought some machinery for \$100,000. It is expected to depreciate at a rate of 8 % per year. What will be the value of the machinery in 6 years?

E. Chapter 11: Sequences and Series

Find the next 3 terms in each arithmetic sequence.

1. $-5, -1, 3, 7, \dots$

2. $6, 8, 10, 12, \dots$

3. $a_1 = 5$ and $a_8 = 54$, what is the 4th term of the arithmetic sequence?

4. Find 3 arithmetic means between 8 and 17.

5. Find the seventh term of the geometric sequence: 7, -21, 63,...
6. In a geometric sequence, $a_1 = 15$, $a_4 = 405$, find r .
7. Find two geometric means between 7 and 56.

Find the sum.

8. $\sum_{k=1}^5 (3k - 1)$

9. $\sum_{n=1}^5 3 \cdot 2^{n-1}$

10. A contest winner will receive prize money over 16 months. The first month's payment is \$3000, and each succeeding payment will be \$200 more than the preceding one. How much money is the total prize money?

Find the sum of each infinite geometric series.

11. $\frac{3}{2} + 1 + \frac{2}{3} \dots$

12. $20 + 4 + \frac{4}{5} + \dots$